Bermudagrass Cultivars Differ in Their Traffic Tolerance

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Photo by Mike Richardson

Device used to simulate traffic in turfgrass research

Summary. Bermudagrass is the most widely used turfgrass species for golf courses and sports fields in the southern U.S. and transition zone. Continuous trafficking from play or equipment can reduce bermudagrass coverage and turf quality. This study evaluated 42 bermudagrass cultivars for their traffic tolerance. Traffic was applied in summer with a Cady traffic simulator to determine differences in traffic tolerance. Twenty-four cultivars were rated highest in traffic tolerance including Barbados, CIS-CD5, CIS-CD7, Contessa, Midlawn, OKC 70-18, OR 2002, Panama, Patriot, Princess 77, Riviera, Sovereign, Sultan, Sunbird, Sunsport (SWI-1001), SWI-1003, SWI-1014, SWI-1046, Southern Star, Sundevil II, Tifsport, Transcontinental, Veracruz, and Yukon. The cultivars Arizona Common, Ashmore, Aussie Green, and B-14 were found to have poor traffic tolerance.

Abbreviations: WAT, weeks after traffic treatment; TPI, turf performance index

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Bermudagrass (*Cynodon* spp.) is the most widely used turfgrass species within the state of Arkansas and throughout the southern US and transition zone due to its low establishment costs, drought tolerance, ability to be grown at a wide range of mowing heights, aggressive growth rate, and traffic tolerance. Regular traffic that occurs on sports fields, golf courses, and residential areas can be detrimental to bermudagrass growth. Previous research has determined which cultivars are the most traffic tolerant (Youngner, 1961; Shearman and Beard, 1975), but more research is needed to examine new cultivars of bermudagrass for traffic tolerance. The objective of this study was to quantify differences in traffic tolerance of bermudagrass cultivars.

Materials and Methods

This study was conducted in both the summer and autumn of 2007 to simulate seasonal differences in traffic tolerance within bermudagrass cultivars. The study was located at the University of Arkansas Research and Extension Center in Fayetteville, Arkansas on the 2002 National Turfgrass Evaluation Program Bermudagrass Trial (Morris, 2007). There was a total of 42 cultivars in the study including 30 cultivars that are currently commercially available. Plot size was 8 by 8 ft., and there were three replications of each cultivar. Plots were maintained under golf course fairway or sports field conditions, with a mowing height of 0.5 inch and monthly applications of 1.0 lb N / 1000ft^2 during the growing season. Traffic was applied weekly using the Cady traffic simulator (Henderson et al., 2005). Once each week for four consecutive weeks, four passes in forward direction were made to each plot. Traffic was applied to half of each plot for summer traffic evaluations and the other half of each plot was used for autumn traffic evaluations.

Digital images were taken prior to each of four traffic applications and after the final traffic application to evaluate damage. Digital image analysis was used to evaluate the amount of green turfgrass cover as affected by the traffic simulator (Richardson et al, 2001). Turf Performance Index (TPI) was used to compare differences among the cultivars. Turf Performance Index was determined as the number of times each cultivar was ranked in the highest statistical category.

Results and Discussion

Although the study was performed in both the summer and autumn to show seasonal differences in traffic tolerance, only summer data are reported here. Autumn coverage data were difficult to interpret as plants began to go into winter dormancy, which made it difficult to determine if green turf coverage was affected by traffic or by the plants losing their green pigment as they entered winter dormancy. For the summer data, however, there were differences in traffic tolerance among the cultivars on each rating date (Table 1).

Twenty-four of the 42 cultivars were ranked in the highest statistical grouping for all four data collection dates, including: Barbados, CIS-CD5, CIS-CD7, Contessa, Midlawn, OKC 70-18, OR 2002, Panama, Patriot, Princess 77, Riviera, Sovereign, Sultan, Sunbird, Sunsport (SWI-1001), SWI-1003, SWI-1014, SWI-1046, Southern Star, Sundevil II, Tifsport, Transcontinental, Veracruz, and Yukon (Table 1). Arizona Common, Ashmore, Aussie Green, and B-14 each had a TPI rating of 0, indicating that they did not have equal traffic tolerance to the best cultivars at any time during the study (Table 1).

The ultimate goal of this study is to help golf course and sports field managers select cultivars that have good traffic tolerance and avoid those cultivars with poor traffic tolerance. Although traffic compacts soil and decreases rooting, this study only measured the immediate response of the turf to the simulated wear that it received. These results demonstrate that several bermudagrass cultivars possess superior traffic tolerance, and some have poor traffic tolerance. Selecting improved, traffic tolerant bermudagrasses will help reduce maintenance inputs and increase sustainability of golf courses and athletic fields. Additional data will be collected during bermudagrass spring green-up of these plots to determine the effect of autumn traffic on bermudagrass cultivars.

Literature Cited

Henderson, J.J., J.L. Lanovaz, J.N. Rogers, III, J.C. Sorochan, and J.T. Vanini. 2005. A new apparatus to simulate athletic field traffic: the Cady traffic simulator. Agron. J. 97:1153-1157.

Morris, K. 2007. 2002 Bermudagrass Trial. NTEP No. 07-10. USDA, Beltsville, Md.

Richardson, M.D., D.E. Karcher, and L.C. Purcell. 2001. Quantifying turfgrass cover using digital image analysis. Crop Sci. 41:1884-1888.

Shearman, R.C. and J.B. Beard. 1975. Turfgrass wear tolerance mechanisms: I. Wear tolerance of seven turfgrass species and quantitative methods for determining turfgrass wear tolerance. Agron. J. 67:208-211.

Youngner, V.B. 1961. Accelerated wear tests on turfgrasses. Agron. J. 53:217-218.

Table 1. Percent bermudagrass cover after summer traffic treatments and turfgrass performance indices for various cultivars.

	WAT1[z]	WAT2	WAT3	WAT4	TPI[y]
	----------% coverage----------				
Arizona Common[xw]	76.3	81.2	83.7	89.5	0
Ashmore[x]	85.1	87.5	86.5	89.2	0
Aussie Green[x]	82.9	76.6	85.2	89.9	0
B-14[w]	75.1	79.0	79.9	87.6	0
Barbados [xw] (SWI-1044)	91.0	92.8	94.3	96.4	4
Celebration[x]	91.1	92.6	89.3	93.3	3
CIS-CD5[w]	88.9	89.8	90.6	94.7	4
CIS-CD6[w]	89.6	89.0	93.3	94.7	3
CIS-CD7[w]	90.3	91.1	91.5	93.8	4
Contessa[xw] (SWI-1045)	95.0	96.0	93.6	96.1	4
GN-1[x]	88.1	80.8	88.9	92.8	2
LaPaloma [xw] (SRX 9500)	84.7	88.6	88.0	93.7	1
Midlawn[x]	94.1	95.9	93.9	96.3	4
Mohawk[xw]	86.2	89.3	90.2	93.7	2
MS-Choice[x]	87.5	91.9	90.1	89.1	1
NuMex Sahara[xw]	85.4	88.5	87.6	93.7	1
OKC 70-18	96.5	94.5	97.8	97.6	4
OR 2002[x]	94.5	94.2	94.9	97.6	4
Panama[xw]	90.0	92.6	92.7	94.6	4
Patriot[x]	92.3	92.8	94.3	93.1	4
Princess 77[xw]	93.4	93.6	92.7	94.9	4
Riviera[xw]	93.5	97.2	96.0	96.6	4
Southern Star[xw]	90.8	94.5	91.3	96.2	4
Sovereign [xw] (SWI-1012)	92.6	93.7	92.8	97.5	4
SR 9554[xw]	87.4	87.8	88.5	93.1	1
Sultan [xw] (FMC-6)	89.0	90.9	90.4	94.2	4
Sunbird[xw] (PST-R68A)	92.9	94.7	92.7	93.4	4
Sundevil II[xw]	89.9	91.9	91.9	95.7	4
Sunsport [xw] (SWI-1001)	91.4	96.1	96.4	97.1	4
Sunstar[xw]	84.5	88.7	89.3	94.1	1
SWI-1003[w]	93.6	94.1	92.9	93.6	4
SWI-1014[w]	89.8	91.5	91.7	94.7	4
SWI-1046[w]	91.9	95.3	93.5	97.1	4
Tifsport[x]	93.3	90.6	94.6	97.7	4
Tift No. 1[w]	87.0	91.3	91.5	95.3	3
Tift No. 2[w]	90.6	92.7	90.3	95.8	3
Tift No. 3	93.8	91.7	89.7	94.6	3
Tift No. 4	93.2	92.7	88.1	95.2	3
Tifway[x]	88.3	90.9	90.6	95.1	3
Transcontinental[xw]	92.0	93.2	94.5	95.6	4
Veracruz[xw] (SWI-1041)	93.9	96.1	96.2	93.4	4
Yukon[xw]	95.8	97.0	94.0	97.7	4
Mean	89.8	91.2	91.3	94.4	
LSD (0.05)	8.0	7.9	7.5	5.2	

[z] weeks after first traffic treatment (WAT). Traffic was applied on four consecutive weeks (0-3 WAT – 7/14/07 to 8/08/07).
[y] Turf Performance Index (TPI) indicates the number of times that particular cultivar was in the highest statistical group.
[x] indicates commercially available cultivar in 2007(www.ntep.org).
[w] indicates seeded bermudagrass cultivar.